AI TEAM TRAINING

Project

TABLE OF CONTENTS

Project – Semantic Segmentation

About

The project involves semantic segmentation of urban scene images from the Cityscapes dataset. Each team, consisting of 5 members, will utilize machine learning models to predict pixel-wise segmentation masks.
The goal is to develop a robust model capable of distinguishing various classes, such as road, vehicles, pedestrians, and buildings, from the provided dataset. Teams will go through all stages of the machine learning pipeline: data preprocessing, model development, training, evaluation, and submission.

Requirements

- **Team Composition**: Each team will have 5 members working collaboratively.
- **Version Control**: Teams are required to use GitHub for version control, code sharing, and collaborative work.
- **Cheating Policy**: Any form of plagiarism or cheating will not be tolerated. Teams must ensure that all code is original or properly attributed.
- **Communication**: Teams should communicate in the discord channels for their respective groups over the text, voice or update channels.

Deliverables

- **Code**: The GitHub repository should contain all scripts and files necessary to replicate the results, including preprocessing, model training, evaluation, and post-processing.
- **Predictions**: Each team must submit their predictions to the Kaggle competition. Prediction format details will be communicated in the future.
- **Model**: The trained model should be uploaded to Kaggle, made public, and linked in the Google form.
- **Presentation**: At the end of the project, teams will present their technical results and methods. Details regarding the presentation will be provided later.

Evaluation Criteria

Dice Score

The evaluation metric for the project is the Dice score. For each image in the test set, teams must predict each pixel's class, with the flattened prediction submitted in the required CSV format.

Phases

- **Data Preparation & Analysis:** Teams will analyze the Cityscapes dataset, using the analysis to preprocess the images and labels.
- **Model Development:** Teams can choose any deep learning architecture suitable for semantic segmentation. However, the project starter code includes placeholders for implementing a preprocessing pipeline, defining the model, and setting up the training loop. You are encouraged to use or adapt this code for your own solutions.
- **Training & Evaluation:** Teams will train their models using PyTorch. The provided skeleton code includes sample classes, a dataset class, and a data loader. Metrics such as Dice Score, loss functions, and IoU must be tracked and plotted throughout the training process.
- **Testing:** Once training is complete, teams will evaluate their model on the test set. You must demonstrate model performance by visualizing sample predictions and submitting the final predictions to Kaggle.

Provided Resources

- **Starter Code:** A repository containing the basic structure for the project, including:
  - Dataset handling and augmentation
  - Data loading functions
  - Skeleton for the model, loss functions, and metrics
  - Code for setting up the training loop
- **Dataset:** The Cityscapes dataset, pre-organized into training and validation sets, will be provided. Make sure to respect the given train/validation split.

Supervision and Monitoring

Supervisors will be granted access to the GitHub repositories to monitor progress. Regular checkpoints will be established to ensure teams are on track. It is mandatory to commit and push changes frequently, enabling supervisors to observe project developments.

Submission

- **GitHub Repository**: Teams must submit their complete repository, including all code used for data preprocessing, training, and evaluation, along with the submission files.
- **Kaggle Model Link**: Teams must upload their trained model to Kaggle, make it public, and provide the link in the Google Form submission.
- **Kaggle Predictions**: The test image's mask submitted in the required CSV format.
- The Task's deadline is **18/10 3:00 PM.**
- Submission form: *Will be sent in the future*
- **Cheating is severely penalized.**